Jisaburo OHWI* & Sadao SAKAMOTO**: Taxonomy, ecology and distribution of *Agropyron humidum* Ohwi et Sakamoto

大井次三郎*・阪本寧男**：ミズタカモジの分類と生態

Extensive studies of *Agropyron* species in Japan were first undertaken by Dr. M. Honda. In 1927, he described a new species, *Agropyron Mayebaranum* Honda, based on the herbarium specimens collected in Kumamoto-ken, Kyushu, by Mr. K. Mayebara (specimens nos. 5 and 95), and, in Okayama-ken, Honshu, by Mr. J. Nikai (specimen no. 1032). Judging from Honda's description and the dedication of the specific name to the first collector, the type specimen must have been the one collected by Mayebara.

Recently the present junior author reexamined the morphology and pollen fertility of the specimens referred by Dr. Honda. He found that both specimens collected by Mayebara are natural interspecific hybrids between so called "*A. Mayebaranum*" and *A. tsukushiense* var. *transiens* Ohwi, having intermediate characters between the parental species and completely empty pollen grains. Therefore, the name *Agropyron Hatusimae* Ohwi (*A. Mayebaranum* var. *intermedium* Hatusima) given by the sinior author (1942) to the above hybrid is a synonym of *A. Mayebaranum* Honda. Hence, a new name, *Agropyron humidum* Ohwi et Sakamoto, is proposed for the true species which is growing together with the formerly called "*A. Mayebaranum* Honda" and which is represented by Honda's specimen No. 1032. A new specimen, TNS No. 5, collected in Koshigaya, Saitama-ken, Honshu by the senior author in 1950, was selected as the type specimen of *A. humidum* (Fig. 1.).

1. Description of the species.

Agropyron humidum Ohwi et Sakamoto, sp. nov.

Agropyron Mayebaranum Honda, in Bot. Mag. Tokyo, **41**: 384, 1927, pro pte., excl. specim. a Mayebara lectis, et Monogr. Poac. Japon. 28. 1930, pro pte.

Roegneria Mayebarana sensu Keng, Fl. Ill. Pl. Prim. Sinic. Gramin. 357. 1959; non Ohwi.

Perenne glaberrimum, rhizomate abbreviato, culmis caespitosis, 35–50 cm altis, robustiusculis, geniculatis, basi longe decumbentibus et postea ad nodos

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surculos erectos gerentibus; folia late linearia plana flaccidula glabra, 7–10 cm longa, 4–7 mm lata, supra scabriuscula, vaginis internodiis saepius longioribus, glabris, laevibus, ligula hyalino-membranacea glabra erosula, ad 2/3 mm longa; spica demum exserta stricte erecta, maturitate a culmorum nodo ultimo fragili facile decidua, 12–20 cm longa, rhachi crassiuscula glabra; spiculae sessiles, etiam anthesi rhachi adpressae, 2–2.5 cm longae, 4–5-florae; glumae subaequales, 7–8 mm longae, lanceolatae, breviaristulatae vel acuminatae, integrae, 5(–7)-nerviae,

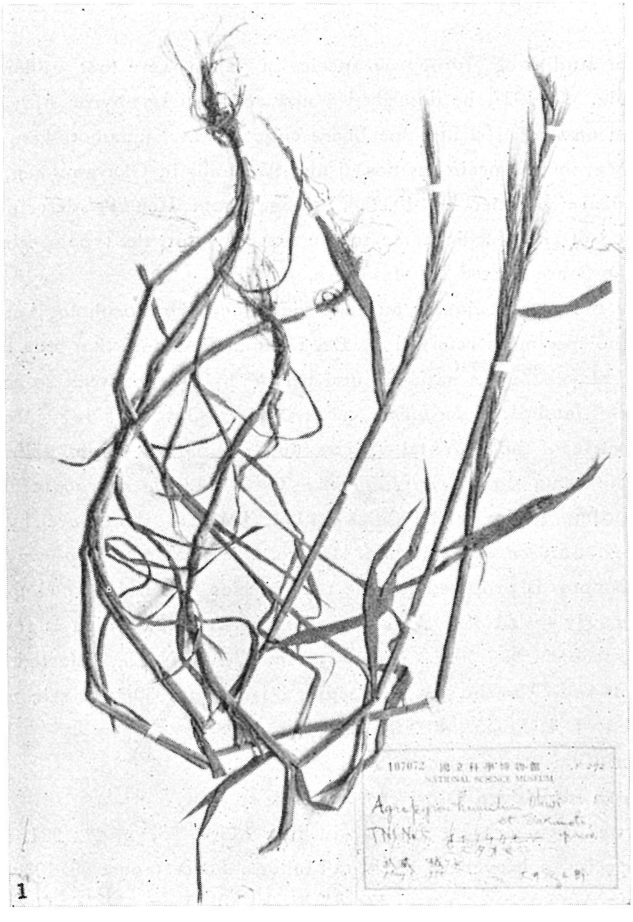

Fig. 1. Type specimen of *Agropyron humidum*.

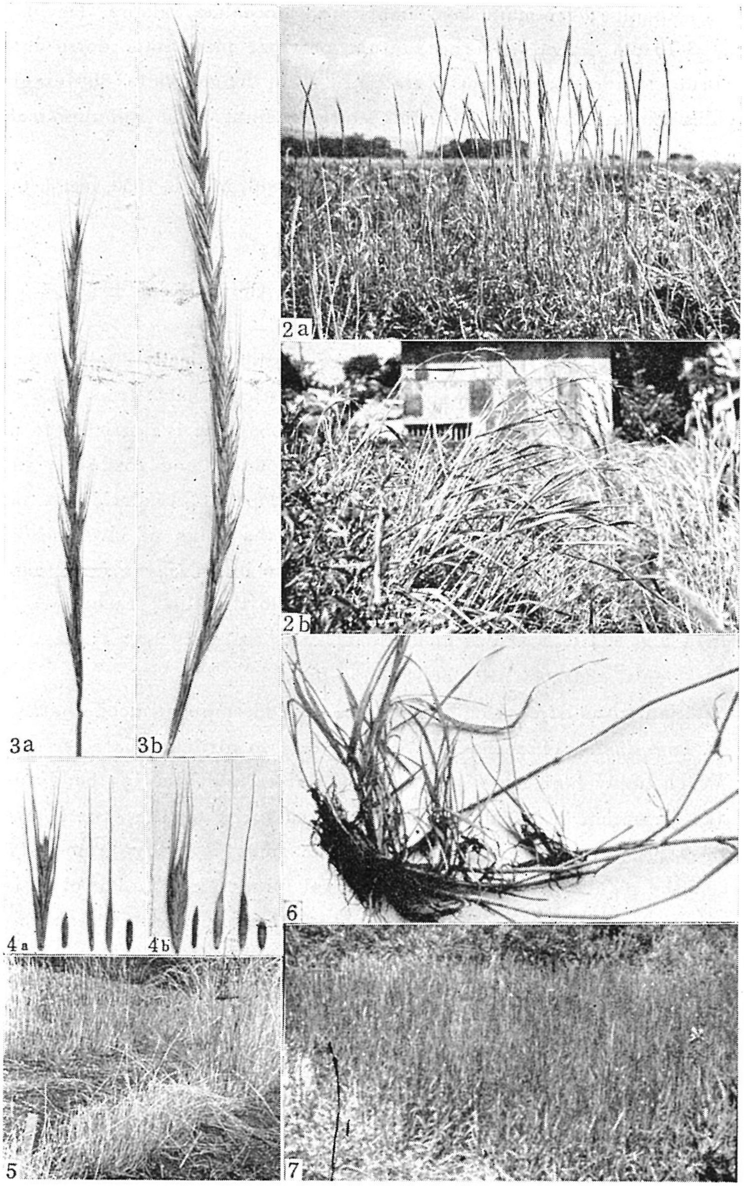

Fig. 2~7. *Agropyron humidum.*

saepe scabriusculae; lemmata laxe imbricata, lanceolata, glabra, laeviuscula, viridula, 8–10 mm longa, superne tantum nervosa, maturitate dorso inferne saepius brunneo-tincta, arista recta scabra, 2–3 cm longa, callo obtuso glabro laevi; palea lemmate aequilonga, carinis supra medium usque spinuloso-scabris; antherae ca. 2.5 mm longae.

Type: Japan: Honshu: Koshigaya, in paddy field, May 8, 1950, leg. J. Ohwi, TNS (NSM) No. 5, in TNS.

Chromosome number: 2n=42 (Sakamoto 1958).

Distribution: Honshu, Kyushu, also found in China (Keng 1959).

Japanese name: Mizuta-kamoji.

Herbarium specimens of *A. humidum* are morphologically similar to those of *A. tsukushiense* but the two plants are clearly distinguishable from each other in natural habitats, as shown in Fig. 2a, b. *A. humidum* is restricted to moist paddy fields or ditches, while *A. tsukushiense* is found along road-sides and in fields. Thus, the two species are considered as allopatric, occurring in nature in different ecological habitats. The rachis of the spike of *A. humidum* is thick and the spike is erect and does not bend like in *A. tsukushiense* (Fig. 3a, b). Spikelets of this species are loosely attached to the thick rachis. A floret is shown in Fig. 4a; it is brown at maturity.

2. Ecological characteristics of *A. humidum*.

Adaptation to moist environment is one of the most pronounced characteristics of *A. humidum*. There have been observed two distinct characters of this species which imply high adaptiveness to the habitat of fallowing paddy fields. One is the formation of an abscission layer at maturity on the node below the flag leaf. Thus, from this node on upward the spike is easily removed from the rest of the plant by wind or other physical forces (Fig. 5). The other is the perennialization of culm with the exception of the uppermost internode and spike. New shoots and roots are produced very easily from the nodes when the condition is favorable (Fig. 6).

The two characteristics mentioned above have not been found in any species

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Fig. 2a. *A. humidum* in natural habitat. Fig. 2b. *A. tsukushiense* in natural habitat. Fig. 3a. Spike of *A. humidum*. ×0.45. Fig. 3b. Spike of *A. tsukushiense*. ×0.45. Fig. 4. Spikelet, empty glume, inside of floret (palea), lemma and seed (from left to right). ×0.75. a. *A. humidum*. b. *A. tsukushiense*. Fig. 5. *A. humidum* at maturity in the experimental field. Fig. 6. A clone of *A. humidum* (Dec. 16, 1957, Misima). Fig. 7. A swarm of *A. humidum* in a fallowing paddy field at Misima.

belonging to tribe Hordeae which is mostly adapted to rather dry habitats. With these two adaptive traits seeds and clones of this species are dispersed uniformly in the paddy field during the preparation for rice planting mostly in June. This seems to be the reason why it occurs in swarms and uniform populations in fallowing paddy fields as observed in the suburbs of Misima, Shizuoka-ken (Fig. 7).

3. Consideration on the distribution of *A. humidum.*

A. humidum is often found together with Chinese milk vetch (*Astragalus sinicus* L.) in the fallowing paddy fields in the suburbs of Misima. Chinese milk vetch is cultivated as green manure or fodder for the livestock. It is sown in Misima in paddy fields after the rice harvest usually in the middle of October. One crop paddy fields are often used for one crop of rice followed by Chinese milk vetch. The field observation showed that the relationship between *A. humidum* and Chinese milk vetch is an important factor in the distribution of this species. The same relationship between an early ecotype of *A. tsukushiense* and Chinese milk vetch was also observed in the fallowing paddy fields in the hills of Misima (Sakamoto 1961).

In 1958 a commercial seed sample of Chinese milk vetch bought at a nursery-shop in Misima was examined; the sample contained seeds of *A. humidum* and the early ecotype of *A. tsukushiense.* Presumably many clones of *A. humidum* could be found in the fields of the seed producing centers of Chinese milk vetch, mainly in Gifu-, Aichi- and Siga-ken, in central Japan. The distribution of *A. humidum* and the ecotype of *A. tsukushiense* was assumed to have a close relationship to the cultivation of Chinese milk vetch.

Herbarium specimens of *Agropyron* at the herbaria of Hokkaido University, University of Tokyo, National Science Museum, Kyoto University and Kyushu University were examined. Specimens of *A. humidum* have been collected in Fukushima-, Tochigi-, Saitama-, Shizuoka-, Gifu-, Shiga-, Okayama-, Fukuoka-, Kumamoto- and Miyazaki-ken, and Tokyo-to. Mostly this species was found in moist paddy fields or ditches.

Chinese milk vetch is a biennial and the place of its origin is China. The cultivation history of this plant in Japan is very old and it has been introduced from the Chinese continent to Japan (Makino 1940, Sato 1957).

Keng (1959) reported the wide occurrence of *A. humidum* in the eastern part of China under the name of *Roegneria Mayebarana* (Honda) Ohwi.

From these facts, it is assumed that *A. humidum* may have originated in the Chinese continent and have been introduced a long time ago from there to Japan together with seeds of Chinese milk vetch or other forage crops. The same assumption was expressed for the early ecotype of *A. tsukushiense* by Sakamoto (1961). In Japan *A. humidum* has become adapted to the environments of fallowing paddy fields.

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摘　　要

オオタチカモジグサといわれているものは，標本にするとカモジグサと区別し難くなる。生育地では湿地に生えて茎は倒伏し，下の方の節から新らしい枝をだして次年には株となって殖えて行く。花穂は点頭せず，花軸が太く，小穂は花時でも花軸に圧着する。護頴は成熟すると基部が汚紫褐色をおびる。花穂が成熟すると最上の節から一番上の葉をつけたままで脱落する，など大変違ったものである。はじめ本田博士がオオタチカモジを記載されるときに前原勘次郎氏採集の標本2枚，二階重楼氏採集の1枚を引用された。標本の数からも，学名に前原氏の名を用いられたことからも，また二階氏の標本が記載よりも花数も少ない小さい株であることからも，前原氏採集の2枚のうちの何れかがタイプとなるものと思われる。筆者の一人はカモジグサ属の細胞遺伝を研究していて，この植物とカモジグサとの間に雑種が出来，しかもこれは不稔で，花粉も充実していないことを知っていた。この前原氏採集の標本の花粉を調べたところ，二枚とも全く充実していないことが判った。これは前記の雑種のためと信じられる。二階氏の標本は充実した花粉があって，従来オオタチカモジといわれていた植物である。以上のようで，オオタチカモジは筆者の一人がタリホノオオタチカモジ（植物分類地理 **11**: 258, 1942）とした植物と同じなので，ここに新らしい学名とミズタカモジの名を用意した。